



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:

LAMB et al.

Serial No.: 10/759,447

Filed: January 16, 2004

FILL MATERIAL FOR DUAL
DAMASCENE PROCESSES

Docket No.: 27269-CNT7

Group Art Unit No.: 2822

Conf. No.: 7841

Examiner: Novacek, Christy L.

Commissioner for Patents
Mail Stop Amendment
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION

I, Xie Shao, do state and declare as follows:

1. I am one of the inventors named on the above-referenced patent application. I am currently an Associate Director in the Research and Development Group at Brewer Science Inc., the assignee of the above-referenced patent application, where I have been employed for 12 years. I have previously served as a Product Manager in the Chemical Division at Brewer Science Inc., and as Group Manager and a Division Manager for the Anti-Reflective Coating Section of the Research and Development Group at Brewer Science Inc.

2. I understand that the Examiner has cited U.S. Patent No. 6,156,479 to Meador et al. for its teaching of an antireflective coating composition, asserting that the Meador et al. patent inherently possesses the claimed pre-bake thermal stability and film shrinkage properties. Under my direction and control, a composition from the Meador et al. patent was duplicated and tested to show that it does not inherently possess the claimed properties.

3. The composition was prepared according to the procedure described in Example 1, Parts A, B, and C of the Meador et al. patent. Prior to selecting Example 1 as the test example, I examined all of the examples of the Meador et al. patent and determined that they would each give very similar results when subjected to the pre-bake thermal stability and film shrinkage tests.

4. The following tables list the ingredients used to prepare the formulation of Example 1. In the first step, a poly(glycidyl methacrylate) (PGM) solution was prepared in cyclohexanone using 20.1 wt. % of glycidyl methacrylate and 1.0 wt. % of azobisisobutyronitrile (AIBN) as shown in Table 1.

Table 1 - Example 1A, Step 1: Preparation of PGM Solution

Ingredients	Parts by Weight (g)	Percentage by Weight
Glycidyl Methacrylate	46.3	20.1%
AIBN	2.3	1.0%
Cyclohexanone	181.5	78.9%

5. In the second step of Part A, the PGM solution from step 1 was used to create the polymer mother liquor using the ingredients shown in Table 2.

Table 2 - Example 1A, Step 2: Polymer Mother Liquor Preparation

Ingredients	Parts by Weight (g)
PGM solution	214.86
Benzoic acid	36.87
Benzylthiethylammonium Chloride	1.72
Cyclohexanone	280.2

6. After precipitating the mother liquor by exactly following Part B of Example 1 of the Meador et al. patent, the resulting polymer was used to prepare an antireflective coating by exactly following the procedure described in Part C of Example 1. The ingredients used are shown in Table 3.

Table 3 - Example 1C: Formulation Preparation

Ingredients	Parts by Weight (g)
Polymer Powder From Example 1B	4.223
1-Methoxy-2-Propanol	118.81
Ethyl Lactate	29.72
Cyclohexanone	16.507
Powderlink® 1174	1.724
<i>p</i> -Toluenesulfonic Acid Monohydrate	0.173

6. After preparing the formulation, it was then coated onto silicon wafers and tested according to the Pre-Bake Thermal Stability Test set forth in the Application on page 17, line 30 through page 18, line 21. Table 4 shows the respective starting thicknesses of the films, the final thickness, and the percent of film removed. In both examples, the thickness essentially stayed the same, resulting in no removal of the film. Thus, the composition did not exhibit the claimed at least about 70% removal when subjected to the Pre-Bake Thermal Stability Test.

Table 4

PRE-BAKE THERMAL STABILITY TEST				
Pre-Bake Temperature	Thickness (Å)	Post-Bake Temperature	Final Thickness (Å)	Percent Removed
155°C	693.01	100°C	694.05	-0.15%
155°C	695.19	100°C	697.12	-0.28%

7. The antireflective coating was also tested according to the Film Shrinkage Test as set forth on page 19, lines 11-26, of the Application. The results are shown in Table 5. The compositions did exhibit less than about 15% film shrinkage.

Table 5

FILM SHRINKAGE TEST				
Pre-Bake Temperature	Thickness (Å)	Post-Bake Temperature	Final Thickness (Å)	Percent Shrinkage
155°C	688.23	205°C	674.26	2.03%
155°C	687.69	205°C	674.24	1.96%

I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that wilful, false statements and the like are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and such wilful false statements may jeopardize the validity of any patents issued from the patent application.

Date: 11-11-2005

Xie Shao

